Containment chamber for milling drum of road scarifiers

The finding accomplishes a containment chamber (1; 10) of the milling drum (2) of road scarifiers (M) of the type comprising a frame (3) mounted on wheels (4) adapted to support said milling drum (2) and provided with a propulsion unit (5) and with a driving seat (6) for the operator. The chamber (1; 10) is laterally delimited by the body sides of said frame (3) and in the upper side, for at least a portion, by a curved wall (8; 11) with the concavity facing said drum (2) and spaced from the active elements (2a) for the removal of the road surface, of which said drum (2) is provided. The air gap (9; 12) defined between said curved wall (8; 11) and the active elements (2a) presents a variable radial width (l) for at least a portion of its development.
Description

[0001] The finding relates to a containment chamber of the milling drum of road scarifiers.

[0002] As known, road scarifiers are machines used for removing bitumen road surfaces, concrete road surfaces, or the like, which cover for example road sites.

[0003] They substantially comprise a frame mounted on wheels provided with a propulsion unit, with a driving seat for the operator, and with a milling drum arranged in contact with the road surface to be removed.

[0004] The milling drum presents a plurality of active elements, realised with different shapes according to the use requirements, which - during the rotation of the milling drum - crumble the road surface with which they come into contact.

[0005] The milling drum is contained into a chamber laterally delimited by the frame body sides, and on the upper side, for at least a portion, by a curved wall with the concavity facing the active elements, and spaced from them.

[0006] The material removed by the active elements is directed - by centrifugal force - towards the above curved wall, which conveys it onto a conveyor belt, which unloads it, for example, into the body of a lorry.

[0007] Figure 1 shows a known embodiment of the containment chamber C of the milling drum T of a road scarifier M, wherein it can be seen that the curved wall P is realised with a profile concentric to the milling drum T by an angle \( \alpha \) of about 90°.

[0008] The air gap defined between the curved wall P and the periphery of drum T presents a constant and the most reduced possible radial width R along its entire development, so as to guarantee an even distribution of the milled material into the air gap itself, preventing it from accumulating above all in the front side of the drum.

[0009] Nevertheless, it has been noted that an excessive reduction of the radial width R causes a marked and fast wear of the curved wall due to the contact with the milled material and due to the significant pressure that the latter exerts on it, being it constrained into a narrow space.

[0010] In particular, the portion of wall which is more affected by this phenomenon is the upper central portion, the farthest from the ground, identified with W in figure 1, wherein the milled material collects by virtue of the transport effect due to the centrally-convergent helicoidal arrangement of the active elements A arranged onto the milling drum T.

[0011] This implies the need of frequently overhauling or entirely or partly replacing the curved wall P.

[0012] A solution adopted in the attempt to reduce said disadvantage consists in realising the curved wall P with high-resistance materials, adapted to delay its wear.

[0013] However, it is evident that the use of said materials implies an increase in the manufacturing costs, and an increase of the price of spare parts.

[0014] Nevertheless, it has been noted that the use of said materials does not solve the problem at the root, since its reasons are not eliminated.

[0015] The present finding has the object of obviating said disadvantages.

[0016] First object of the finding is that of providing a containment chamber for the milling drum of a road scarifier wherein the curved wall covering the drum should be less subject to wear than known embodiments.

[0017] Another object is that of providing the chamber of the finding as being realised using commercial steel plates.

[0018] Last but not least, another object is that of providing the chamber of the finding as having manufacturing costs not exceeding those of the chambers of the known type that are equivalent to it.

[0019] Said objects are attained by providing a containment chamber for the milling drum of road scarifiers of the type comprising a frame mounted on wheels adapted to support said milling drum, and provided with a propulsion unit and with a driving seat for the operator, said chamber being laterally delimited by the body sides of said frame, and on the upper side, for at least a portion, by a curved wall with the concavity facing said drum and spaced from the active elements for the removal of the road surface with which said drum is provided, and it is characterised in that the air gap defined between said curved wall and said active elements presents a variable radial width for at least a portion of its development.

[0020] According to a preferred embodiment, the radial width of the air gap is minimum at the horizontal radial direction which substantially corresponds to the inlet point of the removed material, and it is maximum at the vertical radial direction rotated by 90° with respect to the former one, which substantially corresponds to the outlet point of the removed material.

[0021] According to an embodiment, the curved wall presents a profile which is transversal to the axis of the drum, consisting of an arch of ellipse.

[0022] According to another embodiment, the curved wall presents a profile which is transversal to the axis of the drum, consisting of an arch of circumference.

[0023] Advantageously, the chamber of the finding allows a better conveyance of the milled material than with the prior art.

[0024] Still advantageously, as the chamber of the finding has a greater width in the portion wherein the milled material concentrates, it presents a lower wear.

[0025] Advantageously, the increase of volume of the air gap at the unload, decreases the pressure of the material against the curved wall, and makes the expulsion from the chamber faster.

[0026] Said purposes and advantages shall be illus-
treated more dearly in the description of a preferred embodiment of the finding, which is illustrated as a non-limitative indication with reference to the attached drawings, wherein:

- Figure 1 shows the cross section of a road Scarifier and of the relevant milling drum and containment chamber, according to the prior art;
- Figure 2 shows the containment chamber of the finding, applied to a road Scarifier;
- Figure 3 shows an embodiment of the chamber of the finding in cross section;
- Figure 4 shows another embodiment of the chamber of the finding in cross section.

[0027] As it can be seen in fig. 2 and more in detail in fig. 3, the containment chamber of the finding, referred to in its whole with reference numeral 10, houses the milling drum 2 of a road Scarifier, referred to in its whole with M, which comprises a frame 3 mounted on wheels 4, provided with a propulsion unit 5 and a driving seat 6 for the operator.

[0028] Also, the milling machine 2 is supported by frame 3, and it presents active elements 2a that, during the rotation of the milling drum, come into contact with the surface to be removed which, for example, can be the bitumen road surface 7 which covers a road site.

[0029] In particular in fig. 3 it can be noted that chamber 1 is delimited, on its sides, by the side walls of frame 3 of the road Scarifier, and in the upper side, by a curved wall 8 with concavity 8a facing drum 2 and spaced from its active elements 2a.

[0030] According to the finding, air gap 9 defined between the curved wall 8 and the active elements 2a of the milling drum 2 presents a variable radial width I for at least a portion of its development.

[0031] Thus, in fig. 3 it can be seen that the radial width I changes from the minimum value a at the horizontal radial direction determined by an axis x, to the maximum value b at the vertical radial direction determined by an axis y, where axes x and y represent a Cartesian reference system having the origin coinciding with the centre O of the milling drum 2.

[0032] According to the embodiment shown in fig. 3, the curved surface 8, with reference to the drawn system of axes x, y, presents an ellipse arch profile whose equation, having indicated with a and b the thickness of air gap 9 along the above axes x and y, and with r the radius of the milling drum 2, results as follows:

\[ \frac{x^2}{(r+a)^2} + \frac{y^2}{(r+b)^2} = 1 \]

[0033] By mathematically defining the ellipse using the thickness increment \( i = b - a \) of air gap 9 during its circumferential development corresponding to angle \( \alpha \), the former equation takes on the following form:

\[ \frac{x^2}{(r+a+i)^2} + \frac{y^2}{(r+a+i)^2} = 1 \]

[0034] An embodiment variant of the chamber of the finding, referred to in its whole with reference numeral 10, is represented in figure 4, where it can be seen that it differs from the previous one in that the curved wall 11 which delimits it in its upper side presents a profile shaped as arch of circumference, having radius:

\[ R = r + s + i \]

where:

- \( r \) is the radius of the circle of the milling drum 2;
- \( s \) is the value of the width of air gap 12 at the horizontal radial direction determined by axis x;
- \( i \) represents the value of the translation according to axis x of centre O' of the circumference with radius R which defines the profile of the curved wall 11, with respect to centre O of the milling drum 2. In this case, the profile of the curved wall 11 with respect to the same reference system of axes x, y is expressed by the equation of the circumference which takes on the following form:

\[ (x + i)^2 + y^2 = (r + s + i)^2 \]

[0035] The curved wall of the finding, realised according to the described elliptical or circular profiles, attains the set purposes.

[0036] It is evident that the chamber can be of any shape and size, and the development of the curved wall delimiting the chamber can be geometrically defined also according to another curve with respect to a circle or an ellipse.

[0037] Moreover, it can have variable length according to the requirements of use.

[0038] All the mentioned variants and all other optional variants not illustrated and not described which should be made to the chamber of the finding, inasmuch they are based on the same claimed resolute idea, are to be intended as being protected by the present finding.

Claims

1. Containment chamber (1; 10) of the milling drum (2) of road scarifiers (M) of the type comprising a frame (3) mounted on wheels (4) adapted to support said milling drum (2) and provided with a propulsion unit (5) and with a driving seat (6) for the operator, said chamber (1; 10) being laterally delimited by the body sides of said frame (3) and in the upper side, for at least a portion, by a curved wall (8; 11) with the concavity facing said drum (2) and
spaced from the active elements (2a) for the removal of the road surface, of which said drum (2) is provided, **characterised in that** the air gap (9; 12) defined between said curved wall (8; 11) and said active elements (2a) presents a variable radial width l for at least a portion of its development.

2. Chamber (1; 10) according to claim 1) **characterised in that** said air gap (9; 12) presents an increasing radial width (l) starting from a minimum value (a) at the radial direction determined by the radius (r) of said milling drum (2).

3. Chamber (1) according to claim 1) **characterised in that** said curved wall (8) presents a transverse profile shaped as arch of ellipse.

4. Chamber (1) according to claim 3) **characterised in that** said ellipse is defined with respect to a Cartesian reference system (x, y) having the origin (O) coinciding with the centre of said milling drum (2) and it is represented by the equation

\[
\frac{x^2}{(r+a)^2} + \frac{y^2}{(r+b)^2} = 1
\]

**wherein:**
- a represents the radial width of said air gap (9) measured in radial direction with respect to the drum (2) according to axis x;
- b represents the radial width of said air gap (9) measured in radial direction with respect to the drum (2) according to axis y;
- r represents the radius of said drum (2).

5. Chamber (10) according to claim 1) **characterised in that** said curved wall (11) presents a transverse profile shaped as arch of circumference.

6. Chamber (10) according to claim 5) **characterised in that** said arch of circumference belongs to a circumference which is defined, with respect to an x, y Cartesian reference system having the origin (O) coinciding with the centre of said milling drum (2), by the equation:

\[
(x+i)^2 + y^2 = (r+s+i)^2
\]

**wherein:**
- r represents the radius of said milling drum (2);
- s represents the radial width of said air gap (12) measured in radial direction with respect to the drum (2) according to axis x;
- i represents the value of the translation along the axis (x) of the centre (O') of the circumference with radius (r) which defines the profile of the curved wall (11), with respect to the origin (O) of the reference system (x, y).